

# The Ballarat Naturalist

June 2006



Trailing Goodenia  
*Goodenia lanata*  
(Club Logo)

---

## STROMATOLITES

Earlier this year at the February meeting Tony Wilson, in his talk on the flora and fauna of Western Australia, mentioned the Stromatolites of Shark Bay and commented that he thought they dated back to the early parts of geological history. I thought that a detailed account of these unusual structures might be opportune.

The stromatolites of Shark Bay were the first to be described, recognised back in the 1950s. Others have since been found in a wide range of environments in WA and overseas; they exhibit variations in structure and the Shark Bay individuals are not necessarily typical. Different forms of cyanobacteria have created different shapes and structures, and these also vary depending on water depth. But they are not normally found deeper than 3.5m.



Stromatolites are complex microbial communities of single-celled photosynthetic cyanobacteria. At Shark Bay they appear as serried ranks of "concrete" domes around 30cm in height, hard brown stony structures. There are two ways in which the microbial communities construct stromatolites.

By trapping fine sediment with a sticky film of mucus that each cell secretes, then binding the sediment grains together with  $\text{CaCO}_3$  precipitated from the water. Because the cyanobacteria are photosynthetic and mobile they are able to move towards the light so that they can keep pace with the accumulating sediment.

Cyanobacteria precipitate their own carbonate framework with little incorporation of sediment.

The Shark Bay structures are mostly formed by the first method.

Growth rates are often less than 1mm per year; the Shark Bay stromatolites may be up to 1000 years old. Tracks of horse-drawn wagons which crossed extensive platforms of coalesced stromatolites early in the 20<sup>th</sup> C are still visible today – thus these communities are very vulnerable and boardwalks with information plaques have been erected there to both protect them and educate the public.

It was first thought that these primitive cells survived because the waters of Shark Bay were too hypersaline for predators to survive. Research has shown that they grow in a variety of environments, some hostile such as in glacial lakes in Antarctic, and volcanic springs in Yellowstone National Park in the USA. But they occur in normal marine environments such as the Bahamas. In WA they are found in a number of saline, brackish and freshwater lakes.



Lake Clifton is a 21km long brackish lake less than 1 km wide and rarely more than 1 metre deep, south of Perth. Lake levels fluctuate according to season. One of several lakes in Yalgorup National Park which is populated by cyanobacterial mats, only this one has developed stromatolites. Here they are mostly < 40cm in diameter. They are the product of the precipitation of  $\text{Ca CO}_3$  by a filamentous cyanobacterium *Scytonema*. Groundwater seepage is the main source of carbonates. The water is also populated by a diverse invertebrate fauna containing many grazers, mainly crustaceans and molluscs. So salinity of water and grazers have little to do with the survival of stromatolites.

I had visited Shark Bay, and Rottnest Island where they also occur, in 1996; in 2004 I was able to visit Lake Clifton on my way to the Perth ANN meeting. A boardwalk extends over the extensive stromatolites in this lake and they are best seen at seasons of low water – not, unfortunately when I was there. After the ANN meeting I went up to Cervantes to see Nambung National Park and also visited Lake Thetis, another location of stromatolites – or Thrombolites as they are called locally. The name difference may have something to do with the structure of these forms here.

Lake Thetis is a saline lake, 1.4 times more saline than normal seawater. Groundwater rich in carbonates is discharged into the lake, providing the necessary material for growth. The domes reach 1 metre in diameter and unusually exhibit branched columnar forms within the individual stromatolites. The tops are usually eroded off to reveal a concentric pattern of layers which I was able to photograph. Best developed on the SW side of the lake, one can walk over them as the tops are level with the sandy beach.

Not only are there many places in WA where stromatolites are still living today but there are many localities where their fossilised remains have been found. These

are in Pre-Cambrian rocks, rocks that date from almost 4000 million years old to about 570 million years ago when the explosion in marine life occurred in the seas and which we now call the beginning of the Cambrian period. The best known of these sites is near Marble Bar. Stromatolites here have been dated from between 3450 and 3550 million years old. They represent the oldest firmly established evidence for life on Earth.

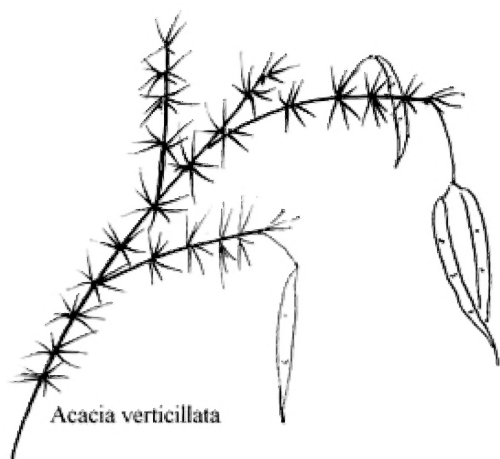
They occur where volcanic rocks – basalt - are mixed with sedimentary rocks. The scene in which they grew up was one of an extensive shallow sea into which lava was being erupted from nearby volcanoes. In the lowest sedimentary layer interbedded with these volcanic rocks the stromatolites occur. Evaporative minerals occur in the sediments indicating a shallow, highly saline system of pools in which the cyanobacteria lived.

Through the Pre-Cambrian era these bacteria flourished, peaking around 850 million years ago in both variety and size. From 7 microns they grew to 20 microns. They are thought to have been the source of the increasing amounts of oxygen in the evolving atmosphere. Such oxygen may have reacted with ferrous iron dissolved in the water to form ferric oxide which was precipitated to form the banded iron formations of the Pilbara.

Threats to living stromatolites include phosphate-rich run-off from agricultural activities – this promotes the growth of algae which will smother them – a current problem in Lake Clifton.

Carol Hall.

Main reference: *Stromatolites* by Ken McNamara. pub. WA Museum.



### **Acacia verticillata—Prickly Moses**

An open, slender or compact shrub 2 to 12 feet high; phyllodes usually in whorls, sharply pointed, and usually with one nerve; flowers in spikes or ovoid heads. Flowering period is September to October. Frequently found in moist situations throughout south-western, central and eastern Victoria.

Thanks to Helen Burgess for the illustration. Text: Rogers, F.J.C. *A Field Guide to Victorian Wattles*, 1978.

## BRUSH-TAILED PHASCOGALES – THEIR LIFE HISTORY AND ECOLOGY

**SPEAKER: ANDY ARNOLD, THREATENED SPECIES MANAGER,  
SW REGION DSE.**

The Brush-tailed Phascogale *Phascogale tapoatafa*, sometimes known as Tuan in Victoria, is locally classified as threatened. A working group was set up to study it and Andy is currently in charge; while his main area of interest is invertebrates, he found it fascinating to work with a creature whose main food supply is invertebrates, especially insects.

The phascogale is a rat-sized marsupial belonging to the Dasyurid family (Carnivorous marsupials) which includes the Tasmanian Devil, quolls and antechinus. It is a 'sharp-snouted hunter with a diagnostic black "bottlebrush" tail' (Menkhorst), with bulging eyes typical of nocturnal creatures. Weighing 150-200gms, it is about 150-260mm long. Its underside is cream, its ears pink, thin and naked. The hairs on its tail are up to 50mm long and can be erected when the animal is excited. Its zoological name is based on the Aboriginal name for the tapping noise made by its forefeet when alarmed.

It is an agile climber, often travelling along the undersides of branches on the rough-barked eucalypts it prefers. It will run headfirst down the trunks; it forages on the ground, preferring sparse herb cover rather than shrub layers. Preferred foods include arthropods, spiders, beetles and nectar from the blooms of box trees. Its typical habitat is the dry sclerophyll woodlands such as the box/ironbark associations.

The females are fiercely territorial, requiring 20-70 ha depending on the quality of the environment; males need 100 ha but these territories may overlap. They use several hollows in stumps and branches as dens with one for nesting and rearing young. Such hollows would have a narrow entrance of 30-40mm but widen inside. Nests are lined with feathers, fur and bark. Competition occurs between individuals if hollows are scarce, so providing nestboxes can assist species survival. Lack of dens results in severe predation.

They eat highly digestible foods as their digestive tract consists of a simple stomach and one intestine. In winter they can conserve energy when food is short by dropping into torpor.

Whilst males die after 11 months, females can live through two breeding seasons. They are sexually mature at 11 months and mate over a 3-4 week period in May and June. The male dies from hormonal changes which result in the breakdown of the immune system, causing parasites to weaken the animal. The consequent reduction in numbers leaves more food resources as the females rear their young.

The gestation period is 30 days, when the young emerge and fasten themselves permanently to a teat for a further 48 days, during which period the mother does

not feed. Litters are generally less than 8 so there is little competition amongst the young for the 8 teats. Lactation continues for 174 days, when the young are weaned after about 170 days over a period of 6-7 weeks. After weaning the female goes out to forage but does not leave the young alone for more than an hour at a time. They would die from hypothermia in under 4 hours if left alone.

Female young occupy the same area where they were born, while the mother moves to a new area. Young males disperse widely. In Victoria their distribution closely follows the box/ironbark woodland.

However their habitat has declined by 40% and become fragmented, the greatest loss being in Gippsland and SW Victoria. They are thought to be extinct in South Australia.

Monitoring is carried out by using hair tubes (sticky tape retains hairs after the passage of small creatures through tubes placed in the bush), the hairs later identified under the microscope. Because population densities are low, the numbers tend to crash from time to time especially after drought or fire, exacerbated by habitat fragmentation. The working group is to determine the threatening processes and recommend measures to help populations recover. Forty monitoring zones have been set up over an area of 2000 ha which would hold over 25 females. Honey-water is used to attract them to trees and Elliot traps are baited with a mix of peanut butter, oats and honey. Local areas such as Clunes, Yandoit and Mt Cole are used. Phascogales caught in the traps have a tiny nick taken out of an ear before release so that re-captures can be noted. DNA testing has determined that there are 5 related groups of phascogales in Victoria – Mt Pilot, Benalla, Kinglake, Euroa and Bendigo-Ararat. Interestingly, phascogales were the first creatures to return to the Mt Pilot-Chiltern area after the recent bushfires.

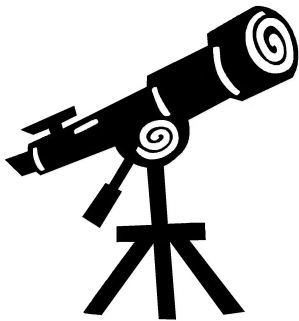
Despite the failure of Andy's laptop to talk to the digital projector, he gave an enthusiastic lecture, interspersing factual information with anecdotes from his experiences with these creatures.

Carol Hall.



## EXCURSION NEWS

### **Mid-month Excursion: Ballarat Astronomical Observatory – 21 May 2006**



Twelve members ventured to the Ballarat Astronomical Observatory on 21 May 2006 at 7pm. Shepparded into a room set up as a theatre we sat with the special glasses supplied ready to view films. There was a choice of videos and we watched those titled a “Trip to Mars” and “Little Things” (asteroids, comets etc.). The video was provided using two data projectors projecting high tech images that when viewed through the glasses became high quality 3D images. There was also a computer program that enabled any point in the sky to be viewed from the perspective of Ballarat and objects zoomed to. 3D photo quality images of planets and other objects were shown.

Following the videos there was a tour of telescopes operated by the observatory and the buildings that house them which included some fascinating stained glass windows.

Fortunately there were a few small breaks in the cloud and we were all able to get brief glimpses through a telescope of Jupiter and three of its moons. Coloured bands were visible, but not the red spot as apparently this was on the dark side. However, earlier we had seen pictures of this.

### ***Additional excursion***

#### **Little River Earth Sanctuary: Sunday 19<sup>th</sup> November 2006**

In April last year our excursion was to the Little River Earth Sanctuary. This was well attended but there is now interest by those who could not go and others who would like to see it again.

The Little River Earth Sanctuary presents the environment as it would have been before European occupation. With a 22 km long feral animal proof fence enclosing and dividing 700 hectares, native animals can be readily seen including: Brush Tailed Phascogales, Eastern Quolls, Red Bellied Pademelons, Southern Brown Bandicoots, Rufous Bettong, Long-nosed Potoroos and others. The enclosed area is visited at dusk and these animals can be seen scampering around in the half light and later in torch light.



## **Minutes of General Meeting 5<sup>th</sup> May 2006**

### **Reports**

- Treasurer's Report:  
Opening Balance: \$3986.68      Closing balance: \$3988.63
- John Gregurke re Ditchfield Lane VCAT hearing: After 2 days the hearing was adjourned to May 15 to allow more time. It appeared that CHW were not going to adhere to environmental requirements to avoid certain trees. John mentioned that the 6 objectors had presented a 40 page submission, Stephanie Davison (former Club Member) being the chief protagonist.

### **General Business**

- The general membership was advised of our club's nomination of Ern Perkins for the Australian Natural History Medallion.
- Ballarat Environmental Network is running a naming competition for the reserves it is managing – email with all reserves listed with directions.
- Pat and Bill Murphy visited "Redgums" in Drysdale re up-coming visit and reported positively re owners and garden! It will be featured on the ABC's *Gardening Australia* sometime in June

### **Show and Tell**

Les Hanrahan – photos of Inkcap fungi.

### **Field Reports**

- Greg Binns: at home in Pleasant St, 4 clumps of spectacular Goldencaps fungi growing on site of liquidambar removed a couple of years ago.
- Ash and Fran Hall (visitors): Laanecoorie Reservoir – pair of Tawny Frogmouths in River Redgum.
- Tony Johns: at Colignan – Tree Martins at dusk entering burrow in cliff on edge of Murray River; flock of about 100 Wood Swallows forming a pattern high in the sky, some drinking at water's edge, chattering like parrots – they were easily spooked.
- Carol Hall: Lake Colac Bird Sanctuary - a dozen Yellow-billed Spoonbills, 3 Magpie Geese, a dozen Caspian Terns, one Black-winged Stilt, numerous Grey Teal, a couple of Pelicans.



CALENDAR

June

- Fri 2 Phil Kinghorn, Geologist—*The Geology of Gold*
- Sun 4 Geology Excursion with Phil Kinghorn—9.30am to 1.00pm (meet usual place—see below)
- Tues 27 Committee Meeting 7.30pm at John Gregurke’s, 1 John St, Wendouree.

July

- Fri 7 Carol Hall, Geographer—*Quebec and New England in the Fall.*
- Sun 9 Fungi Excursion with Les Hanrahan
- Sat 22 “Redgums” Garden at Drysdale (October Excursion) will be featured on *ABC Gardening Australia*

---

Supper Duty:	June:	Helen Burgess
	July	

---

Committee

President.....	Mr Peter Dalman
Vice-President.....	Mr Greg Binns
Secretary.....	Mrs Carol Hall
Treasurer .....	Mr Les Hanrahan
Miss Helen Burgess.....	Mrs Pat Murphy.....
Miss Maureen Christie .....	Mrs Claire Dalman .....
Mr John Gregurke .....	Mrs Alison Williams .....
Mr John Williams.....	

**Correspondence:** PO Box 328W, Ballarat West, 3350

**Email:**

**Website:** [www.ballarat.yourguide.com.au](http://www.ballarat.yourguide.com.au) Click on Local Info. Search Environment

**Meetings** are held at Ballarat Horticultural Centre, cnr. Gregory & Gillies Sts (VicRoads 254 F8) on the first Friday of the month at 7.30pm.

**Excursions:** Depart from Ballarat Market Place (formerly Creswick Plaza) Creswick Rd., Ballarat (VicRoads 255 M10) at 9.30am unless otherwise specified.

A monthly publication of the Field Naturalists’ Club of Ballarat Inc.  
Incorporation # A0014919P ABN 13 150 403 135